

IPv6 Unicast Address Assignment Considerations

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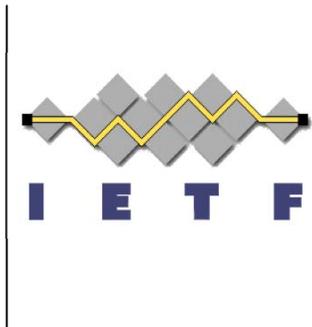
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IPv6 Address Plan Considerations



- Network designers and operators need to reconsider their existing approaches to network addressing due to IPv6's different address architecture and allocation policies
 - Lots of people seem to be asking related questions
- This draft aims to provide considerations on planning addressing aspects of IPv6 deployments
- This draft also has (or will have) examples of address plans for different kind of networks
 - Currently enterprise in early draft form, with ISP solicited...



Network Level Considerations

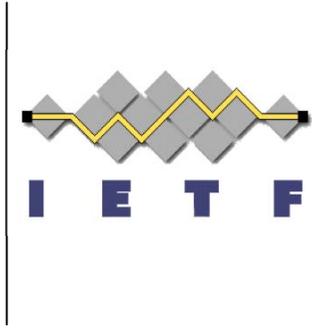
- Global Unique Addresses
 - Multi-addressing quite normal in IPv6
- 6Bone Address Space
 - While it lasts... (due to deprecate on 06/06/06)
- Unique Local IPv6 Addresses
 - Including possible uses
- Network Level Design Considerations
 - Sizing the network allocation from your upstream provider
 - Address space conservation (in the context of the HD ratio)
 - Flexible assignment methods (RFC 3531)



Subnet Prefix Considerations

Point2point draft content is partially captured in this section

- Typical IPv6 prefix length is /64, but IPv6 specifications do in principle allow either shorter or longer subnet prefixes
- Deploying a /64 IPv6 prefix on a device
 - Proscribed by RFC3177 (IAB/IESG Recommendations on IPv6 Address Allocations to Sites)
 - Allows Stateless Address Autoconfiguration (SLAAC) (RFC2462)
- Prefixes shorter than /64 assigned to a device
 - Example: 2001:db8:0001::1/60
 - Would allow “more devices” on a single link
 - Considered as **bad practice** and has no real application



Subnet Prefix Considerations (ctd)

- Prefixes longer than /64 assigned to a device
 - Example: 2001:db8:1:1:1::1/72
 - Motivation to do this is address conservation
 - Effort should be made to avoid overlap with some well known addresses, for example:
 - Subnet Router Anycast Address (RFC3513)
 - Embedded RP (RFC3956)
 - ISATAP Addresses
 - Usually the only instance of this is a point-to-point link
 - See next slide...



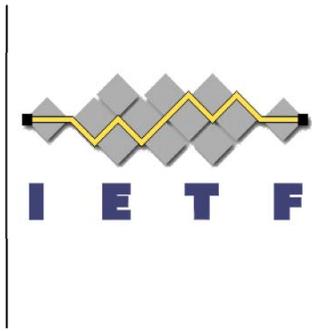
Subnet Prefix Considerations

- When prefix is more the 80 bits, then "u" and "g" bits (respectively the 81st and 82nd bit) need to be taken into consideration and should be set correctly (RFC3513)
 - Note: we don't believe any applications use these bits?
- Special cases
 - /126 addresses
 - Valid addressing and is seen sometimes on point-to-point interfaces
 - /127 addresses
 - **Not Valid prefix** (RFC3627) due to overlap with anycast addresses
 - /128 addresses
 - Valid address and frequently seen as device loopback addresses
 - Care should be taken to avoid overlap with well known addresses



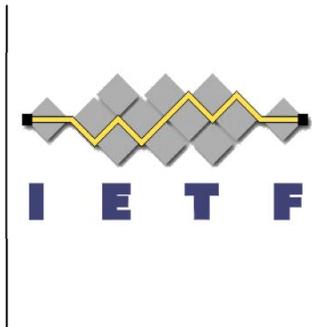
IPv6 Interface ID allocation

- Automatic EUI-64 Format Option
 - Stateless Address Autoconfiguration
- Privacy Extensions (RFC3041)
 - Create complexity for network management
 - May not have reverse DNS entries
- Cryptographically Generated IPv6 Addresses
 - Regenerate CGA if host compromised
- Manual/Dynamic Assignment Option
 - Avoid the previously discussed 'overlaps'



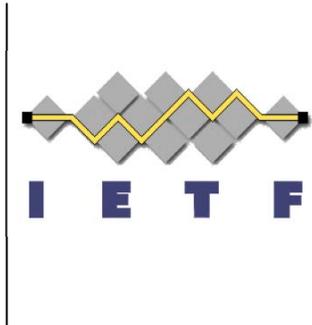
Enterprise Consideration

- Case Study: **University of Southampton (UK)**
 - Enterprise example
 - Obtaining general IPv6 network prefixes
 - Forming an address (subnet) allocation plan
 - Congruent with IPv4 administrative subnets
 - Other considerations
 - Node configuration considerations
 - Address management (DHCPv4 in use)
 - Privacy addresses
 - Observations



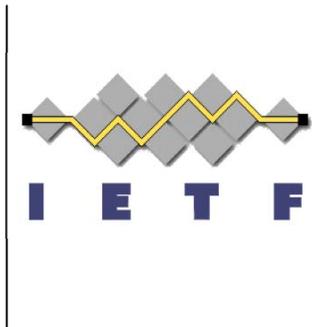
Initial Feedback Summary

- Various editorial suggestions
- The HD-ratio for IPv6 is for *sites* not addresses like in IPv4
- Add note on ULA vs (legacy) site-local addresses and mention a potential impact during renumbering
- What about mentioning Provider Independent proposals?
 - http://www.arin.net/policy/proposals/2006_4.html
- When segmenting into /64 use NAP principles for scattering the subnets (topology hiding at cost of aggregation)
- Should draft mention something on multihoming? (No?)
- Should draft mention larger ULA prefixes than /48 (like /47) as discussed (but omitted) when ULA draft was created?
- Mention that DDNS is not recommended for privacy addresses (large DNS load, and have global receiving address anyway)



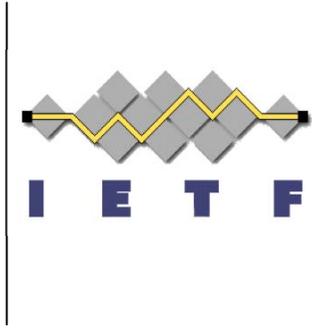
Initial Feedback Summary

- CGA addresses are indistinguishable, should they be included?
- Embedded-RP section:
 - Suggestion was that text was not clear. It should mention that there are 15 possible addresses that can be used for Embedded RP (not for multicast in general)
 - Using these addresses is not a 'constraint', i.e. you can use these addresses for non-RP usage, but you may regret it later, so just bear that in mind
 - So make router address on link <prefix>::1 through ::f ?
- Case study
 - Add info on # of subnets
 - Other general clarification suggested



Next Steps

- Any thoughts from the group on potential integration of the point2point draft?
 - Different thrusts
- Adopt as WG document?
- Invite Co-author for the Service Provider Case Study
 - Volunteers? Commercial ISP preferred
- Please send text/comments to main editor
 - Gunter Van de Velde - gvandeve@cisco.com



THANK YOU!